2010-10-01 Pd 2

★ $\frac{d}{dx}(\sin x) = \cos x$

★ $\frac{d}{dx}(\cos x) = -\sin x$

★ $\frac{d}{dx}(\tan x) = \sec^2 x$

$\frac{d}{dx}(\cot x) = -\csc^2 x$

★ $\frac{d}{dx}(\sec x) = \sec x \tan x$

$\frac{d}{dx}(\csc x) = -\csc x \cot x$

$\frac{d}{dx}\left(\frac{\sin x}{\cos x}\right) =$

$\frac{(\overset{f'}{\cos x})(\overset{g}{\cos x}) - (\overset{f}{\sin x})(\overset{g'}{-\sin x})}{\cos^2 x}$

$= \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$

$= \frac{1}{\cos^2 x} = \sec^2 x$

$$\frac{d}{dx}(\sin x) = \lim_{h\to 0} \frac{\sin(x+h)-\sin(x)}{h}$$

$$= \lim_{h\to 0} \frac{(\sin x\cos h + \sin h\cos x) - \sin x}{h}$$

$$= \lim_{h\to 0} \frac{(\sin x)(\cos h - 1) + (\sin h)(\cos x)}{h}$$

$$= \sin x \lim_{h\to 0}\left(\frac{\cos h - 1}{h}\right) + \cos x \lim_{h\to 0}\left(\frac{\sin h}{h}\right)$$

$\sin x\,(-0)$ $\qquad$ 1

2010-10-01 Pd 3

$\star \quad \frac{d}{dx}(\sin x) = \cos x$

$\star \quad \frac{d}{dx}(\cos x) = -\sin x$

$\star \quad \frac{d}{dx}(\tan x) = \frac{d}{dx}\left(\frac{\sin x}{\cos x}\right) = \sec^2 x$

$\frac{d}{dx}\left(\frac{1}{\tan x}\right) = \ldots$

$= \frac{d}{dx}\left(\frac{\cos x}{\sin x}\right) =$

$\frac{d}{dx}(\cot x) = -\csc^2 x$

$\star \quad \frac{d}{dx}(\sec x) = \sec x \tan x$

$\frac{d}{dx}(\csc x) = -\csc x \cot x$

$$\frac{d}{dx}(\sin x) = \lim_{h\to 0} \frac{\sin(x+h)-\sin(x)}{h}$$

$\sin x\cosh - \sin x = \sin x(\cosh - 1)$

$$= \lim_{h\to 0} \frac{(\sin x\cosh + \sinh\cos x) - \sin x}{h}$$

$$= \lim_{h\to 0} \frac{(\sin x)(\cosh - 1) + (\sinh)(\cos x)}{h}$$

$$= (\sin x)\lim_{h\to 0}\frac{\cosh - 1}{h} + \cos x \lim_{h\to 0}\frac{\sinh}{h}$$

$\to 0$ $\qquad$ $\to 1$

$$= \cos x$$